

## MULTILAYER CERAMIC CHIP CAPACITORS



### **CGA Series Automotive Grade Soft Termination**

**Type:**

**CGA2 [EIA CC0402]  
CGA3 [EIA CC0603]  
CGA4 [EIA CC0805]  
CGA5 [EIA CC1206]  
CGA6 [EIA CC1210]  
CGA7 [EIA CC1808]  
CGA8 [EIA CC1812]  
CGA9 [EIA CC2220]**



# REMINDERS

Please read before using this product

## SAFETY REMINDERS

### REMINDERS

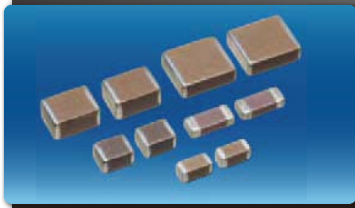
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Notice: Effective January 2013, TDK will use a new catalog number which adds product thickness and packaging specification detail. This new catalog number should be referenced on all catalog orders going forward, and is not applicable for OEM part number orders. Please be aware the last five digits of the catalog number will differ from the item description (internal control number) on the product label. Contact your local TDK Sales representative for more information.

(Example)

Catalog Issued date	Catalog Number	Item Description (On Delivery Label)
Prior to January 2013	C1608C0G1E103J(080AA)	C1608C0G1E103JT000N
January 2013 and Later	C1608C0G1E103J080AA	C1608C0G1E103JT000N

# MULTILAYER CERAMIC CHIP CAPACITORS



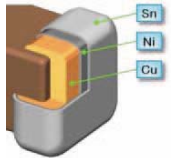
## CGA Series Soft Termination

Type: CGA2 [EIA CC0402], CGA3 [EIA CC0603], CGA4 [EIA CC0805], CGA5 [EIA CC1206], CGA6 [EIA CC1210], CGA7 [EIA CC1808], CGA8 [EIA CC1812], CGA9 [EIA CC2220]

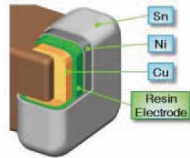
### Features

- Improved board bending resistance, drop impact resistance, thermal shock resistance, and heat cycle properties.
- Conductive resin absorb external stress to protect solder joint parts and capacitor body.
- Compliance with the RoHS Directive.
- AEC-Q200 compliant.

#### Standard Product



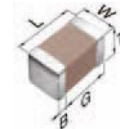
#### Soft Termination



### Applications

- Switching power supply
- Telecom base station
- Electronic circuits mounted on alumina substrate
- SMT application which requires bending robustness in which solder joint reliability is problematic

### Shape & Dimensions



L	Body Length
W	Body Width
T	Body Height
B	Terminal Width
G	Terminal Spacing

### Catalog Number Construction

CGA • 6 • P • 3 • X7S • 1H • 106 • K • 250 • A • E

#### Series Name

#### Dimensions L x W (mm)

Code	Length	Width	Terminal
2	1.00 + 0.15/-0.05	0.50 + 0.10/-0.05	0.10 min.
3	1.60 + 0.20/-0.10	0.80 + 0.15/-0.10	0.20 min.
4	2.00 + 0.45/-0.20	1.25 + 0.25/-0.20	0.20 min.
5	3.20 + 0.40/-0.20	1.60 + 0.30/-0.20	0.20 min.
6	3.20 + 0.50/-0.40	2.50 ± 0.30	0.20 min.
7	4.50 + 0.30/-0.20	2.00 ± 0.15	0.20 min.
8	4.50 + 0.50/-0.40	3.20 ± 0.40	0.20 min.
9	5.70 + 0.50/-0.40	5.00 ± 0.40	0.20 min.

\*Dimension tolerance are typical values

#### Thickness T Code (mm)

Code	Thickness
B	0.50 mm
E	0.80 mm
F	0.85 mm
H	1.15 mm
J	1.25 mm
K	1.30 mm
L	1.60 mm
M	2.00 mm
N	2.30 mm
P	2.50 mm

#### Voltage Condition for Life Test

Symbol	Condition
1	1 × R.V.
2	2 × R.V.
3	1.5 × R.V.
4	1.2 × R.V.

#### Temperature Characteristics

Temperature Characteristics	Temperature Coefficient or Capacitance Change	Temperature Range
C0G	0 ±30ppm/°C	-55 to +125°C
X7R	±15%	-55 to +125°C
X7S	±22%	-55 to +125°C
X7T	+22/-33%	-55 to +125°C
X8R	±15%	-55 to +150°C
X8L	+15/-40%	-55 to +150°C

#### Rated Voltage (DC)

Code	Voltage (DC)	Code	Voltage (DC)
0J	6.3V	2E	250V
1A	10V	2W	450V
1C	16V	2J	630V
1E	25V	3A	1000V
1V	35V	3D	2000V
1H	50V	3F	3000V
2A	100V		

#### Nominal Capacitance (pF)

The capacitance is expressed in three digit codes and in units of pico Farads (pF). The first and second digits identify the first and second significant figures of the capacitance. The third digit identifies the multiplier. R designates a decimal point.

Ex. 0R2 = 0.2pF; 103 = 10,000pF; 105 = 1,000,000pF = 1,000nF = 1µF

#### Capacitance Tolerance

Code	Tolerance
J	± 5%
K	± 10%
M	± 20%

#### Nominal Thickness

Code	Thickness	Code	Thickness
050	0.50mm	130	1.30mm
080	0.80mm	160	1.60mm
085	0.85mm	200	2.00mm
115	1.15mm	230	2.30mm
125	1.25mm	250	2.50mm

#### Packaging Style

Code	Style
A	178mm Reel, 4mm Pitch
B	178mm Reel, 2mm Pitch
K	178mm Reel, 8mm Pitch

#### Special Reserved Code

Code	Description
E	Soft Termination

\*See Thickness T Code for complete list

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Chart

## CGA2(1005) [EIA CC0402]

### Capacitance Range Chart

Temperature Characteristics : C0G (0±30 ppm/°C), X7R (±15%), X7S (±22%), X8R (±15%)  
Rated Voltage : 100V (2A), 50V (1H), 35V (1V), 25V (1E), 16V (1C), 10V (1A)

Capacitance		Tolerance	C0G	X7R					X7S		X8R			
(pF)	Code		1H (50V)	1H (50V)	1V (35V)	1E (25V)	1C (16V)	1C (16V)	1A (10V)	2A (100V)	1H (50V)	1E (25V)	1C (16V)	
100	101	J: ±5%	■											
150	151	K: ±10%												
220	221	M: ±20%								■	■			
330	331													
470	471													
680	681													
1,000	102			■										
1,500	152													
2,200	222			■										
3,300	332													
4,700	472			■										
6,800	682													
10,000	103			■										
15,000	153													
22,000	223			■										
33,000	333													
47,000	473			■										
100,000	104			■										
220,000	224				■	■	■							
470,000	474							■	■					

Standard Thickness 0.50 mm

## Capacitance Range Chart

## CGA3(1608) [EIA CC0603]

### Capacitance Range Chart

Temperature Characteristics : C0G (0±30 ppm/°C), X7R (±15%), X7S (±22%), X8R (±15%)  
Rated Voltage : 100V (2A), 50V (1H), 35V (1V), 25V (1E), 16V (1C), 10V (1A)

Capacitance		Tolerance	C0G	X7R					X7S			X8R			
(pF)	Code		1H (50V)	2A (100V)	1H (50V)	1V (35V)	1E (25V)	2A (100V)	1C (16V)	1A (10V)	2A (100V)	1H (50V)	1E (25V)	1C (16V)	
100	101	J: ±5%	■												
1,000	102	K: ±10%		■	■										
1,500	152	M: ±20%													
2,200	222			■	■										
3,300	332														
4,700	472			■	■										
6,800	682														
10,000	103			■	■										
15,000	153														
22,000	223			■	■										
33,000	333														
47,000	473				■			■							
68,000	683														
100,000	104				■			■							
150,000	154														
220,000	224				■	■									
330,000	334														
470,000	474				■	■	■								
1,000,000	105														
2,200,000	225							■	■						

Standard Thickness 0.80 mm

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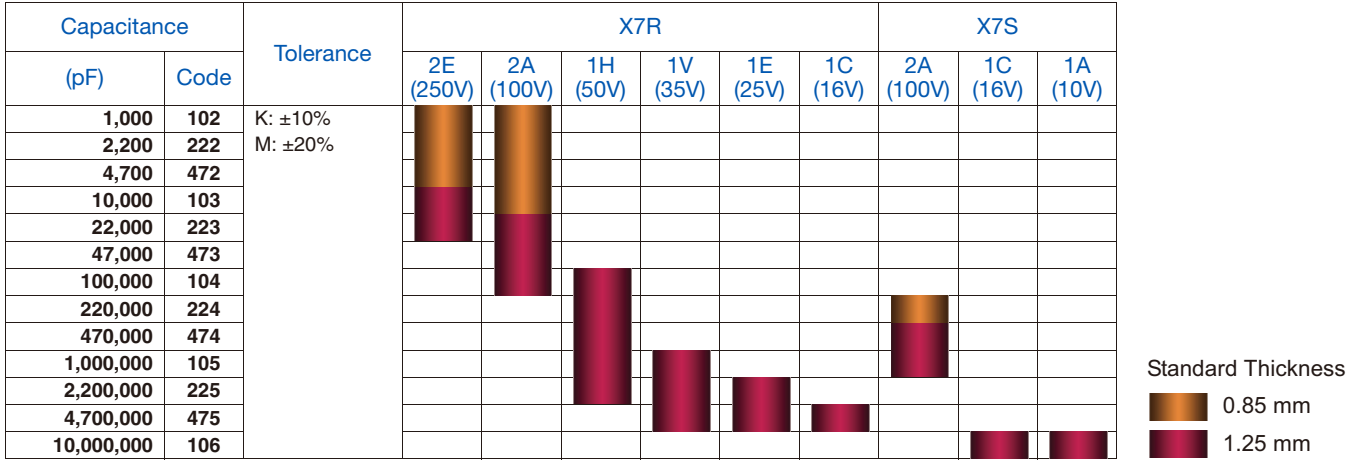
## Capacitance Range Chart

## CGA4(2012) [EIA CC0805]

### Capacitance Range Chart

Temperature Characteristics : X7R (±15%), X7S (±22%)

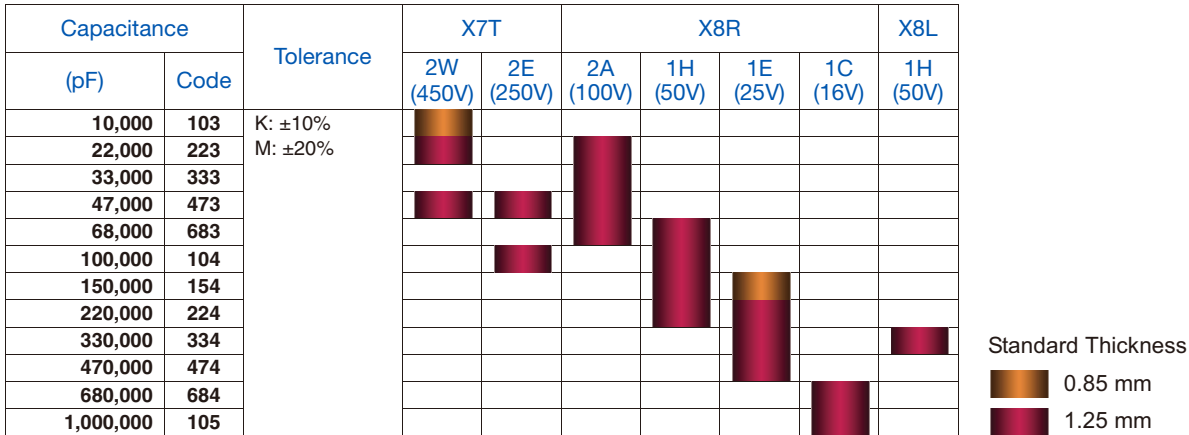
Rated Voltage : 250V (2E), 100V (2A), 50V (1H), 35V (1V), 25V (1E), 16V (1C), 10V (1A)



### Capacitance Range Chart

Temperature Characteristics : X7T (+22/-33%), X8R (±15%), X8L (+15/-40%)

Rated Voltage : 450V (2W), 250V (2E), 100V (2A), 50V (1H), 25V (1E), 16V (1C)



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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Chart

## CGA5(3216) [EIA CC1206]

### Capacitance Range Chart

Temperature Characteristics : X7R (±15%), X7S (±22%)

Rated Voltage : 630V (2J), 250V (2E), 100V (2A), 50V (1H), 35V (1V), 25V (1E), 6.3V (0J)

Capacitance		Tolerance	X7R							X7S
(pF)	Code		2J (630V)	2E (250V)	2A (100V)	1H (50V)	1V (35V)	1E (25V)	0J (6.3V)	2A (100V)
1,000	102	K: ±10% M: ±20%	█							
2,200	222									
3,300	332									
4,700	472									
10,000	103			█						
22,000	223			█	█					
33,000	333			█						
47,000	473				█					
100,000	104					█				
220,000	224						█			
470,000	474							█		
1,000,000	105								█	
2,200,000	225									█
4,700,000	475									
10,000,000	106									
22,000,000	226	M: ±20%							█	

Standard Thickness

- █ 1.15 mm
- █ 1.30 mm
- █ 1.60 mm

### Capacitance Range Chart

Temperature Characteristics : X7T (+22/-33%), X8R (±15%)

Rated Voltage : 630V (2J), 450V (2W), 250V (2E), 100V (2A), 50V (1H), 25V (1E), 16V (1C)

Capacitance		Tolerance	X7T			X8R			
(pF)	Code		2J (630V)	2W (450V)	2E (250V)	2A (100V)	1H (50V)	1E (25V)	1C (16V)
47,000	473	K: ±10% M: ±20%	█						
100,000	104			█		█			
150,000	154								
220,000	224								
330,000	334				█				
470,000	474								
680,000	684								
1,000,000	105								
1,500,000	155								
2,200,000	225								
3,300,000	335								
4,700,000	475								█

Standard Thickness

- █ 1.15 mm
- █ 1.60 mm

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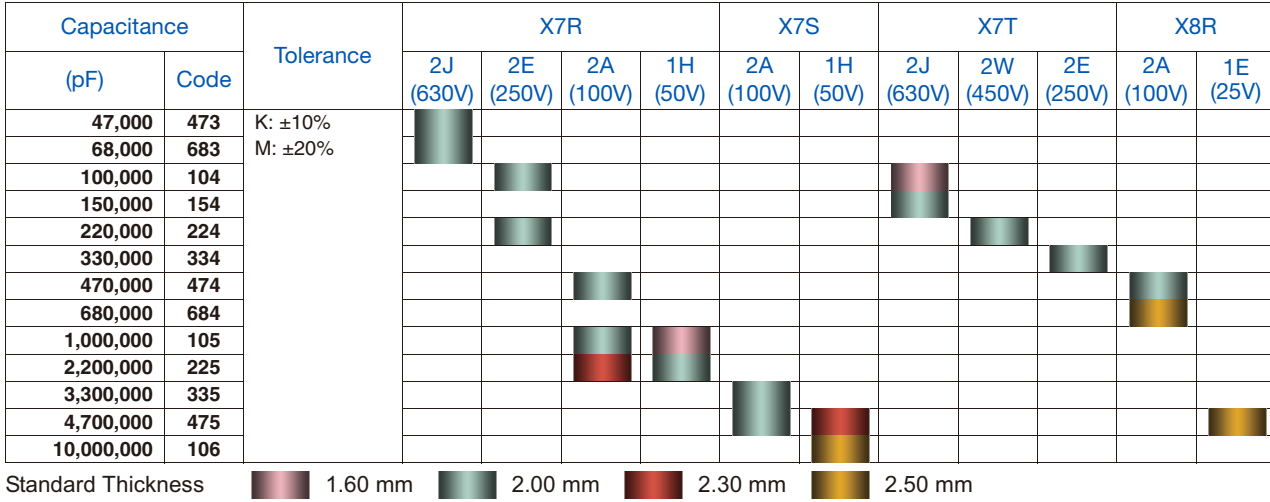
# MULTILAYER CERAMIC CHIP CAPACITORS TDK

## Capacitance Range Chart

## CGA6(3225) [EIA CC1210]

### Capacitance Range Chart

Temperature Characteristics : X7R (±15%), X7S (±22%), X7T (+22/-33%), X8R (±15%)  
 Rated Voltage : 630V (2J), 450V (2W), 250V (2E), 100V (2A), 50V (1H), 25V (1E)

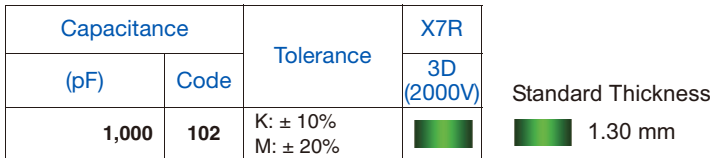


## Capacitance Range Chart

## CGA7(4520) [EIA CC1808]

### Capacitance Range Chart

Temperature Characteristics : X7R (±15%)  
 Rated Voltage : 2000V (3D)

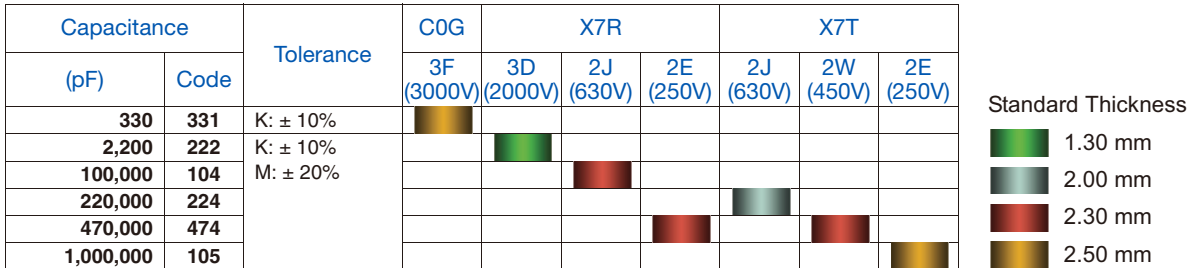


## Capacitance Range Chart

## CGA8(4532) [EIA CC1812]

### Capacitance Range Chart

Temperature Characteristics : C0G (0 ± 30ppm/°C) , X7R (±15%), X7T (+22/-33%)  
 Rated Voltage : 3000V (3F), 2000V (3D), 630V (2J), 450V (2W), 250V (2E)



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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Chart

## CGA9(5750) [EIA CC2220]

### Capacitance Range Chart

Temperature Characteristics : X7R ( $\pm 15\%$ ), X7S ( $\pm 22\%$ ), X7T ( $+22/-33\%$ )

Rated Voltage : 630V (2J), 450V (2W), 250V (2E), 100V (2A)

Capacitance		Tolerance	X7R		X7S	X7T		
(pF)	Code		2J (630V)	2E (250V)	2A (100V)	2J (630V)	2W (450V)	2E (250V)
220,000	224	K: $\pm 10\%$ M: $\pm 20\%$						
470,000	474							
1,000,000	105							
2,200,000	225							
10,000,000	106							

Standard Thickness

2.30 mm

2.50 mm



# MULTILAYER CERAMIC CHIP CAPACITORS

## Capacitance Range Table

### Class 1 (Temperature Compensating)


Temperature Characteristics: C0G (-55 to +125°C, 0 ± 30 ppm/°C)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number	
				Rated Voltage Edc : 3000V	Rated Voltage Edc : 50V
100pF	1005	0.50+0.10/-0.05	±5%		CGA2B2C0G1H101J050BE
	1608	0.80+0.15/-0.10	±5%		CGA3E2C0G1H101J080AE
330pF	4532	2.50 ± 0.20	±10%	CGA8P1C0G3F331K250KE	

### Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125°C, ±15%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number			
				Rated Voltage Edc : 2000V	Rated Voltage Edc : 630V	Rated Voltage Edc : 250V	Rated Voltage Edc : 100V
1nF	1005	0.50+0.10/-0.05	±10%				CGA2B2X7R1H102K050BE
			±20%				CGA2B2X7R1H102M050BE
	1608	0.80 +0.15/-0.10	±10%			CGA3E2X7R2A102K080AE	CGA3E2X7R1H102K080AE
			±20%			CGA3E2X7R2A102M080AE	CGA3E2X7R1H102M080AE
	2012	0.85±0.15	±10%		CGA4F3X7R2E102K085AE	CGA4F2X7R2A102K085AE	
			±20%		CGA4F3X7R2E102M085AE	CGA4F2X7R2A102M085AE	
3216	1.15±0.15	±10%	CGA5H4X7R2J102K115AE				
		±20%	CGA5H4X7R2J102M115AE				
2.2nF	1005	0.50+0.10/-0.05	±10%				CGA2B2X7R1H222K050BE
			±20%				CGA2B2X7R1H222M050BE
	1608	0.80+0.15/-0.10	±10%			CGA3E2X7R2A222K080AE	CGA3E2X7R1H222K080AE
			±20%			CGA3E2X7R2A222M080AE	CGA3E2X7R1H222M080AE
	2012	0.85±0.15	±10%		CGA4F3X7R2E222K085AE	CGA4F2X7R2A222K085AE	
			±20%		CGA4F3X7R2E222M085AE	CGA4F2X7R2A222M085AE	
3216	1.15±0.15	±10%	CGA5H4X7R2J222K115AE				
		±20%	CGA5H4X7R2J222M115AE				
3.3nF	1005	0.50+0.10/-0.05	±10%				CGA2B3X7R1H103K050BE
			±20%				CGA2B3X7R1H103M050BE
	1608	0.80+0.15/-0.10	±10%			CGA3E2X7R2A103K080AE	CGA3E2X7R1H103K080AE
			±20%			CGA3E2X7R2A103M080AE	CGA3E2X7R1H103M080AE
	2012	0.85±0.15	±10%		CGA4J3X7R2E103K125AE	CGA4J2X7R2A103K125AE	
			±20%		CGA4J3X7R2E103M125AE	CGA4J2X7R2A103M125AE	
3216	1.15±0.15	±10%	CGA5H4X7R2J103K115AE				
		±20%	CGA5H4X7R2J103M115AE				
10nF	1005	0.50+0.10/-0.05	±10%				CGA2B3X7R1H223K050BE
			±20%				CGA2B3X7R1H223M050BE
	1608	0.80+0.15/-0.10	±10%			CGA3E2X7R2A223K080AE	CGA3E2X7R1H223K080AE
			±20%			CGA3E2X7R2A223M080AE	CGA3E2X7R1H223M080AE
	2012	0.85±0.15	±10%		CGA4J3X7R2E223K125AE	CGA4J2X7R2A223K125AE	
			±20%		CGA4J3X7R2E223M125AE	CGA4J2X7R2A223M125AE	
3216	1.15±0.15	±10%	CGA5H3X7R2E223K115AE				
		±20%	CGA5H3X7R2E223M115AE				
22nF	1005	0.50+0.10/-0.05	±10%				CGA2B3X7R1H223K050BE
			±20%				CGA2B3X7R1H223M050BE
	1608	0.80+0.15/-0.10	±10%			CGA3E2X7R2A223K080AE	CGA3E2X7R1H223K080AE
			±20%			CGA3E2X7R2A223M080AE	CGA3E2X7R1H223M080AE
	2012	1.25 +0.25/-0.20	±10%		CGA4J3X7R2E223K125AE	CGA4J2X7R2A223K125AE	
			±20%		CGA4J3X7R2E223M125AE	CGA4J2X7R2A223M125AE	
3216	1.15±0.15	±10%	CGA5K4X7R2J223K130AE				
		±20%	CGA5K4X7R2J223M130AE				
33nF	3216	1.60+0.30/-0.20	±10%	CGA5L4X7R2J333K160AE			
			±20%	CGA5L4X7R2J333M160AE			

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Table

### Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125°C, ±15%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number			
				Rated Voltage Edc : 630V	Rated Voltage Edc : 250V	Rated Voltage Edc : 100V	Rated Voltage Edc : 50V
47nF	1005	0.50+0.10/-0.05	±10%				CGA2B3X7R1H473K050BE
			±20%				CGA2B3X7R1H473M050BE
	1608	0.80+0.15/-0.10	±10%				CGA3E2X7R1H473K080AE
			±20%				CGA3E2X7R1H473M080AE
	2012	1.25+0.25/-0.20	±10%			CGA4J2X7R2A473K125AE	
			±20%			CGA4J2X7R2A473M125AE	
3216	1.60+0.30/-0.20	±10%		CGA5L3X7R2E473K160AE			
		±20%		CGA5L3X7R2E473M160AE			
3225	2.00+0.30/-0.20	±10%	CGA6M4X7R2J473K200AE				
		±20%	CGA6M4X7R2J473M200AE				
68nF	3225	2.00+0.30/-0.20	±10%	CGA6M4X7R2J683K200AE			
			±20%	CGA6M4X7R2J683M200AE			
100nF	1005	0.50+0.10/-0.05	±10%				CGA2B3X7R1H104K050BE
			±20%				CGA2B3X7R1H104M050BE
	1608	0.80+0.15/-0.10	±10%				CGA3E2X7R1H104K080AE
			±20%				CGA3E2X7R1H104M080AE
	2012	1.25+0.25/-0.20	±10%			CGA4J2X7R2A104K125AE	
			±20%			CGA4J2X7R2A104M125AE	CGA4J2X7R1H104M125AE
3216	1.60+0.30/-0.20	±10%		CGA5L3X7R2E104K160AE	CGA5L2X7R2A104K160AE		
		±20%		CGA5L3X7R2E104M160AE	CGA5L2X7R2A104M160AE		
3225	2.00+0.30/-0.20	±10%		CGA6M3X7R2E104K200AE			
		±20%		CGA6M3X7R2E104M200AE			
4532	2.30+0.30/-0.20	±10%	CGA8N4X7R2J104K230KE				
		±20%	CGA8N4X7R2J104M230KE				
220nF	1608	0.80+0.15/-0.10	±10%				CGA3E3X7R1H224K080AE
			±20%				CGA3E3X7R1H224M080AE
	2012	1.25+0.25/-0.20	±10%				CGA4J2X7R1H224K125AE
			±20%				CGA4J2X7R1H224M125AE
	3216	1.15±0.15	±10%			CGA5H2X7R2A224K115AE	
			±20%			CGA5H2X7R2A224M115AE	
3225	2.00+0.30/-0.20	±10%		CGA6M3X7R2E224K200AE			
		±20%		CGA6M3X7R2E224M200AE			
5750	2.30+0.30/-0.20	±10%	CGA9N4X7R2J224K230KE				
		±20%	CGA9N4X7R2J224M230KE				
470nF	1608	0.80+0.15/-0.10	±10%				CGA3E3X7R1H474K080AE
			±20%				CGA3E3X7R1H474M080AE
	2012	1.25+0.25/-0.20	±10%				CGA4J3X7R1H474K125AE
			±20%				CGA4J3X7R1H474M125AE
	3216	1.60+0.30/-0.20	±10%			CGA5L2X7R2A474K160AE	
			±20%			CGA5L2X7R2A474M160AE	
3225	2.00+0.30/-0.20	±10%			CGA6M2X7R2A474K200AE		
		±20%			CGA6M2X7R2A474M200AE		
4532	2.00+0.30/-0.20	±10%		CGA8N3X7R2E474K230KE			
		±20%		CGA8N3X7R2E474M230KE			
1µF	2012	1.25+0.25/-0.20	±10%				CGA4J3X7R1H105K125AE
			±20%				CGA4J3X7R1H105M125AE
	3216	1.60+0.30/-0.20	±10%			CGA5L2X7R2A105K160AE	CGA5L3X7R1H105K160AE
			±20%			CGA5L2X7R2A105M160AE	CGA5L3X7R1H105M160AE
	3225	1.60+0.30/-0.20	±10%				CGA6L2X7R1H105K160AE
			±20%				CGA6L2X7R1H105M160AE
3225	2.00+0.30/-0.20	±10%			CGA6M2X7R2A105K200AE		
		±20%			CGA6M2X7R2A105M200AE		
5750	2.00+0.30/-0.20	±10%		CGA9N3X7R2E105K230KE			
		±20%		CGA9N3X7R2E105M230KE			
2.2µF	2012	1.25+0.25/-0.20	±10%				CGA4J3X7R1H225K125AE
			±20%				CGA4J3X7R1H225M125AE
	3216	1.60+0.30/-0.20	±10%				CGA5L3X7R1H225K160AE
			±20%				CGA5L3X7R1H225M160AE
	3225	2.00+0.30/-0.20	±10%				CGA6M3X7R1H225K200AE
			±20%				CGA6M3X7R1H225M200AE
3225	2.30+0.30/-0.20	±10%			CGA6N3X7R2A225K230AE		
		±20%			CGA6N3X7R2A225M230AE		
4.7µF	3216	1.60+0.30/-0.20	±10%				CGA5L3X7R1H475K160AE
			±20%				CGA5L3X7R1H475M160AE

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Table

### Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125°C, ±15%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number			
				Rated Voltage Edc : 35V	Rated Voltage Edc : 25V	Rated Voltage Edc : 16V	Rated Voltage Edc : 6.3V
220nF	1005	0.50+0.10/-0.05	±10%	CGA2B1X7R1V224K050BE	CGA2B3X7R1E224K050BE	CGA2B2X7R1C224K050BE	
			±20%	CGA2B1X7R1V224M050BE	CGA2B3X7R1E224M050BE	CGA2B2X7R1C224M050BE	
			±10%	CGA3E3X7R1V224K080AE			
470nF	1608	0.80+0.15/-0.10	±10%	CGA3E3X7R1V224M080AE			
			±20%	CGA3E1X7R1V474K080AE	CGA3E3X7R1E474K080AE		
			±20%	CGA3E1X7R1V474M080AE	CGA3E3X7R1E474M080AE		
1µF	1608	0.80+0.15/-0.10	±10%	CGA3E1X7R1V105K080AE	CGA3E1X7R1E105K080AE		
			±20%	CGA3E1X7R1V105M080AE	CGA3E1X7R1E105M080AE		
			±10%	CGA4J3X7R1V105K125AE			
2.2µF	2012	1.25+0.25/-0.20	±10%	CGA4J3X7R1V105M125AE			
			±20%	CGA4J1X7R1V225K125AE	CGA4J3X7R1E225K125AE		
			±20%	CGA4J1X7R1V225M125AE	CGA4J3X7R1E225M125AE		
4.7µF	3216	1.60+0.30/-0.20	±10%	CGA5L3X7R1V225K160AE	CGA5L2X7R1E225K160AE		
			±20%	CGA5L3X7R1V225M160AE	CGA5L2X7R1E225M160AE		
			±10%	CGA4J1X7R1V475K125AE	CGA4J1X7R1E475K125AE	CGA4J3X7R1C475K125AE	
10µF	3216	1.60+0.30/-0.20	±10%	CGA4J1X7R1V475M125AE	CGA4J1X7R1E475M125AE	CGA4J3X7R1C475M125AE	
			±20%	CGA5L1X7R1V475K160AE			
			±20%	CGA5L1X7R1V475M160AE			
22µF	3216	1.60+0.30/-0.20	±10%	CGA5L1X7R1V106K160AE	CGA5L1X7R1E106K160AE		
			±20%	CGA5L1X7R1V106M160AE	CGA5L1X7R1E106M160AE		
			±20%				CGA5L1X7R0J226M160AE

### Class 2 (Temperature Stable)

Temperature Characteristics: X7S (-55 to +125°C, ±22%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number			
				Rated Voltage Edc : 100V	Rated Voltage Edc : 50V	Rated Voltage Edc : 16V	Rated Voltage Edc : 10V
47nF	1608	0.80+0.15/-0.10	±10%	CGA3E3X7S2A473K080AE			
			±20%	CGA3E3X7S2A473M080AE			
100nF	1608	0.80+0.15/-0.10	±10%	CGA3E3X7S2A104K080AE			
			±20%	CGA3E3X7S2A104M080AE			
220nF	2012	0.85±0.15	±10%	CGA4F3X7S2A224K085AE			
			±20%	CGA4F3X7S2A224M085AE			
470nF	1005	0.50+0.10/-0.05	±10%			CGA2B1X7S1C474K050BE	CGA2B3X7S1A474K050BE
			±20%			CGA2B1X7S1C474M050BE	CGA2B3X7S1A474M050BE
			±10%	CGA4J3X7S2A474K125AE			
1µF	2012	1.25+0.25/-0.20	±10%	CGA4J3X7S2A474M125AE			
			±20%	CGA4J3X7S2A105K125AE			
			±20%	CGA4J3X7S2A105M125AE			
2.2µF	1608	0.80+0.15/-0.10	±10%			CGA3E1X7S1C225K080AE	CGA3E3X7S1A225K080AE
			±20%			CGA3E1X7S1C225M080AE	CGA3E3X7S1A225M080AE
			±10%	CGA5L3X7S2A225K160AE			
3.3µF	3225	2.00+0.30/-0.20	±10%	CGA5L3X7S2A225M160AE			
			±20%	CGA6M3X7S2A335K200AE			
			±20%	CGA6M3X7S2A335M200AE			
4.7µF	3225	2.00+0.30/-0.20	±10%	CGA6M3X7S2A475K200AE			
			±20%	CGA6M3X7S2A475M200AE			
			±10%		CGA6N3X7S1H475K230AE		
10µF	2012	1.25+0.25/-0.20	±10%		CGA6N3X7S1H475M230AE		
			±20%			CGA4J1X7S1C106K125AE	CGA4J3X7S1A106K125AE
			±20%			CGA4J1X7S1C106M125AE	CGA4J3X7S1A106M125AE
3225	2.50±0.30	2.50±0.30	±10%		CGA6P3X7S1H106K250AE		
			±20%		CGA6P3X7S1H106M250AE		
			±10%	CGA9N3X7S2A106K230KE			
5750	2.30+0.30/-0.20	2.30+0.30/-0.20	±10%	CGA9N3X7S2A106M230KE			
			±20%				

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Table

### Class 2 (Temperature Stable)

Temperature Characteristics: X7T (-55 to +125°C, +22/-33%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number		
				Rated Voltage Edc : 630V	Rated Voltage Edc : 450V	Rated Voltage Edc : 250V
10 nF	2012	0.85 ± 0.15	± 10%	CGA4F4X7T2W103K085AE		
			± 20%	CGA4F4X7T2W103M085AE		
22 nF	2012	1.25 +0.25/-0.20	± 10%	CGA4J4X7T2W223K125AE		
			± 20%	CGA4J4X7T2W223M125AE		
47 nF	2012	1.25 +0.25/-0.20	± 10%	CGA4J4X7T2W473K125AE	CGA4J3X7T2E473K125AE	
			± 20%	CGA4J4X7T2W473M125AE	CGA4J3X7T2E473M125AE	
	3216	1.60 +0.30/-0.20	± 10%	CGA5L1X7T2J473K160AE		
			± 20%	CGA5L1X7T2J473M160AE		
2012	1.25 +0.25/-0.20	± 10%	CGA4J3X7T2E104K125AE			
		± 20%	CGA4J3X7T2E104M125AE			
100 nF	3216	1.60 +0.30/-0.20	± 10%	CGA5L4X7T2W104K160AE		
			± 20%	CGA5L4X7T2W104M160AE		
3225	1.60 +0.30/-0.20		± 10%	CGA6L1X7T2J104K160AE		
			± 20%	CGA6L1X7T2J104M160AE		
150nF	3225	2.00+0.30/-0.20	±10%	CGA6M1X7T2J154K200AE		
			±20%	CGA6M1X7T2J154M200AE		
3216	1.60 +0.30/-0.20		± 10%	CGA5L3X7T2E224K160AE		
			± 20%	CGA5L3X7T2E224M160AE		
220 nF	3225	2.00 +0.30/-0.20	± 10%	CGA6M4X7T2W224K200AE		
			± 20%	CGA6M4X7T2W224M200AE		
4532	2.00 +0.30/-0.20		± 10%	CGA8M1X7T2J224K200KE		
			± 20%	CGA8M1X7T2J224M200KE		
330nF	3225	2.00+0.30/-0.20	±10%	CGA6M3X7T2E334K200AE		
			±20%	CGA6M3X7T2E334M200AE		
4532	2.30 +0.30/-0.20		± 10%	CGA8N4X7T2W474K230KE		
			± 20%	CGA8N4X7T2W474M230KE		
470 nF	5750	2.50 ± 0.30	± 10%	CGA9P1X7T2J474K250KE		
			± 20%	CGA9P1X7T2J474M250KE		
4532	2.50 ± 0.30		± 10%	CGA8P3X7T2E105K250KE		
			± 20%	CGA8P3X7T2E105M250KE		
1 μF	5750	2.50 ± 0.30	± 10%	CGA9P4X7T2W105K250KE		
			± 20%	CGA9P4X7T2W105M250KE		
2.2 uF	5750	2.50 ± 0.30	± 10%	CGA9P3X7T2E225K250KE		
			± 20%	CGA9P3X7T2E225M250KE		

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# MULTILAYER CERAMIC CHIP CAPACITORS

## Capacitance Range Table

### Class 2 (Temperature Stable)

Temperature Characteristics: X8R (-55 to +150°C, ±15%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number			
				Rated Voltage Edc : 100V	Rated Voltage Edc : 50V	Rated Voltage Edc : 25V	Rated Voltage Edc : 16V
150pF	1005	0.50+0.10/-0.05	±10%	CGA2B2X8R2A151K050BE	CGA2B2X8R1H151K050BE		
			±20%	CGA2B2X8R2A151M050BE	CGA2B2X8R1H151M050BE		
220pF	1005	0.50+0.10/-0.05	±10%	CGA2B2X8R2A221K050BE	CGA2B2X8R1H221K050BE		
			±20%	CGA2B2X8R2A221M050BE	CGA2B2X8R1H221M050BE		
330pF	1005	0.50+0.10/-0.05	±10%	CGA2B2X8R2A331K050BE	CGA2B2X8R1H331K050BE		
			±20%	CGA2B2X8R2A331M050BE	CGA2B2X8R1H331M050BE		
470pF	1005	0.50+0.10/-0.05	±10%	CGA2B2X8R2A471K050BE	CGA2B2X8R1H471K050BE		
			±20%	CGA2B2X8R2A471M050BE	CGA2B2X8R1H471M050BE		
680pF	1005	0.50+0.10/-0.05	±10%	CGA2B2X8R2A681K050BE	CGA2B2X8R1H681K050BE		
			±20%	CGA2B2X8R2A681M050BE	CGA2B2X8R1H681M050BE		
1nF	1005	0.50+0.10/-0.05	±10%	CGA2B2X8R2A102K050BE	CGA2B2X8R1H102K050BE		
			±20%	CGA2B2X8R2A102M050BE	CGA2B2X8R1H102M050BE		
	1608	0.80+0.15/-0.10	±10%	CGA3E2X8R2A102K080AE	CGA3E2X8R1H102K080AE		
			±20%	CGA3E2X8R2A102M080AE	CGA3E2X8R1H102M080AE		
1.5nF	1005	0.50+0.10/-0.05	±10%	CGA2B2X8R2A152K050BE	CGA2B2X8R1H152K050BE		
			±20%	CGA2B2X8R2A152M050BE	CGA2B2X8R1H152M050BE		
	1608	0.80+0.15/-0.10	±10%	CGA3E2X8R2A152K080AE	CGA3E2X8R1H152K080AE		
			±20%	CGA3E2X8R2A152M080AE	CGA3E2X8R1H152M080AE		
2.2nF	1005	0.50+0.10/-0.05	±10%	CGA2B2X8R2A222K050BE	CGA2B2X8R1H222K050BE		
			±20%	CGA2B2X8R2A222M050BE	CGA2B2X8R1H222M050BE		
	1608	0.80+0.15/-0.10	±10%	CGA3E2X8R2A222K080AE	CGA3E2X8R1H222K080AE		
			±20%	CGA3E2X8R2A222M080AE	CGA3E2X8R1H222M080AE		
3.3nF	1005	0.50+0.10/-0.05	±10%	CGA2B3X8R2A332K050BE	CGA2B2X8R1H332K050BE		
			±20%	CGA2B3X8R2A332M050BE	CGA2B2X8R1H332M050BE		
	1608	0.80+0.15/-0.10	±10%	CGA3E2X8R2A332K080AE	CGA3E2X8R1H332K080AE		
			±20%	CGA3E2X8R2A332M080AE	CGA3E2X8R1H332M080AE		
4.7nF	1005	0.50+0.10/-0.05	±10%		CGA2B2X8R1H472K050BE		
			±20%		CGA2B2X8R1H472M050BE		
	1608	0.80+0.15/-0.10	±10%	CGA3E2X8R2A472K080AE	CGA3E2X8R1H472K080AE		
			±20%	CGA3E2X8R2A472M080AE	CGA3E2X8R1H472M080AE		
6.8nF	1005	0.50+0.10/-0.05	±10%		CGA2B3X8R1H682K050BE	CGA2B2X8R1E682K050BE	
			±20%		CGA2B3X8R1H682M050BE	CGA2B2X8R1E682M050BE	
	1608	0.80+0.15/-0.10	±10%	CGA3E2X8R2A682K080AE	CGA3E2X8R1H682K080AE		
			±20%	CGA3E2X8R2A682M080AE	CGA3E2X8R1H682M080AE		
10nF	1005	0.50+0.10/-0.05	±10%		CGA2B3X8R1H103K050BE	CGA2B2X8R1E103K050BE	
			±20%		CGA2B3X8R1H103M050BE	CGA2B2X8R1E103M050BE	
	1608	0.80+0.15/-0.10	±10%	CGA3E2X8R2A103K080AE	CGA3E2X8R1H103K080AE		
			±20%	CGA3E2X8R2A103M080AE	CGA3E2X8R1H103M080AE		
15nF	1005	0.50+0.10/-0.05	±10%			CGA2B3X8R1E153K050BE	
			±20%			CGA2B3X8R1E153M050BE	
	1608	0.80+0.15/-0.10	±10%	CGA3E2X8R2A153K080AE	CGA3E2X8R1H153K080AE		
			±20%	CGA3E2X8R2A153M080AE	CGA3E2X8R1H153M080AE		
22nF	1005	0.50+0.10/-0.05	±10%			CGA2B3X8R1E223K050BE	
			±20%			CGA2B3X8R1E223M050BE	
	1608	0.80+0.15/-0.10	±10%	CGA3E3X8R2A223K080AE	CGA3E2X8R1H223K080AE		
			±20%	CGA3E3X8R2A223M080AE	CGA3E2X8R1H223M080AE		
2012	1.25+0.25/-0.20	±10%	CGA4J2X8R2A223K125AE				
		±20%	CGA4J2X8R2A223M125AE				
33nF	1005	0.50+0.10/-0.05	±10%				CGA2B3X8R1C333K050BE
			±20%				CGA2B3X8R1C333M050BE
	1608	0.80+0.15/-0.10	±10%		CGA3E2X8R1H333K080AE		
			±20%		CGA3E2X8R1H333M080AE		
2012	1.25+0.25/-0.20	±10%	CGA4J3X8R2A333K125AE				
		±20%	CGA4J3X8R2A333M125AE				
47nF	1005	0.50+0.10/-0.05	±10%				CGA2B3X8R1C473K050BE
			±20%				CGA2B3X8R1C473M050BE
	1608	0.80+0.15/-0.10	±10%		CGA3E2X8R1H473K080AE		
			±20%		CGA3E2X8R1H473M080AE		
2012	1.25+0.25/-0.20	±10%	CGA4J3X8R2A473K125AE				
		±20%	CGA4J3X8R2A473M125AE				
68nF	1608	0.80+0.15/-0.10	±10%		CGA3E3X8R1H683K080AE	CGA3E2X8R1E683K080AE	
			±20%		CGA3E3X8R1H683M080AE	CGA3E2X8R1E683M080AE	
	2012	1.25+0.25/-0.20	±10%	CGA4J3X8R2A683K125AE	CGA4J2X8R1H683K125AE		
			±20%	CGA4J3X8R2A683M125AE	CGA4J2X8R1H683M125AE		
1608	0.80+0.15/-0.10	±10%		CGA3E3X8R1H104K080AE	CGA3E2X8R1E104K080AE		
		±20%		CGA3E3X8R1H104M080AE	CGA3E2X8R1E104M080AE		
100nF	2012	1.25+0.25/-0.20	±10%		CGA4J2X8R1H104K125AE		
			±20%		CGA4J2X8R1H104M125AE		
	3216	1.15±0.15	±10%	CGA5H2X8R2A104K115AE			
			±20%	CGA5H2X8R2A104M115AE			

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# MULTILAYER CERAMIC CHIP CAPACITORS

## Capacitance Range Table

### Class 2 (Temperature Stable)


Temperature Characteristics: X8R (-55 to +150°C, ±15%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number			
				Rated Voltage Edc : 100V	Rated Voltage Edc : 50V	Rated Voltage Edc : 25V	Rated Voltage Edc : 16V
150nF	1608	0.80+0.15/-0.10	±10%			CGA3E3X8R1E154K080AE	
			±20%			CGA3E3X8R1E154M080AE	
	2012	0.85±0.15	±10%			CGA4F2X8R1E154K085AE	
			±20%			CGA4F2X8R1E154M085AE	
	3216	1.60+0.30/-0.20	±10%		CGA4J3X8R1H154K125AE		
			±20%		CGA4J3X8R1H154M125AE		
			±10%	CGA5L2X8R2A154K160AE			
			±20%	CGA5L2X8R2A154M160AE			
220nF	1608	0.80+0.15/-0.10	±10%			CGA3E3X8R1E224K080AE	
			±20%			CGA3E3X8R1E224M080AE	
	2012	1.25+0.25/-0.20	±10%		CGA4J3X8R1H224K125AE	CGA4J2X8R1E224K125AE	
			±20%		CGA4J3X8R1H224M125AE	CGA4J2X8R1E224M125AE	
	3216	1.60+0.30/-0.20	±10%		CGA5L3X8R2A224K160AE		
			±20%		CGA5L3X8R2A224M160AE		
			±10%			CGA3E3X8R1C334K080AE	
			±20%			CGA3E3X8R1C334M080AE	
330nF	1608	0.80+0.15/-0.10	±10%			CGA4J2X8R1E334K125AE	
			±20%			CGA4J2X8R1E334M125AE	
	2012	1.25+0.25/-0.20	±10%	CGA5L3X8R2A334K160AE	CGA5L2X8R1H334K160AE		
			±20%	CGA5L3X8R2A334M160AE	CGA5L2X8R1H334M160AE		
	3216	1.60+0.30/-0.20	±10%				CGA3E3X8R1C474K080AE
			±20%				CGA3E3X8R1C474M080AE
			±10%			CGA4J3X8R1E474K125AE	
			±20%			CGA4J3X8R1E474M125AE	
470nF	1608	0.80+0.15/-0.10	±10%			CGA5L2X8R1H474K160AE	
			±20%			CGA5L2X8R1H474M160AE	
	2012	1.25+0.25/-0.20	±10%				CGA4J3X8R1E474M125AE
			±20%				
	3216	1.60+0.30/-0.20	±10%	CGA6M3X8R2A474K200AE			
			±20%	CGA6M3X8R2A474M200AE			
			±10%			CGA4J3X8R1C684K125AE	
			±20%			CGA4J3X8R1C684M125AE	
680nF	1608	0.80+0.15/-0.10	±10%			CGA5L3X8R1H684K160AE	
			±20%			CGA5L3X8R1H684M160AE	
	2012	1.25+0.25/-0.20	±10%				CGA4J3X8R1C105K125AE
			±20%				CGA4J3X8R1C105M125AE
	3216	1.60+0.30/-0.20	±10%		CGA5L3X8R1H105K160AE	CGA5L2X8R1E105K160AE	
			±20%		CGA5L3X8R1H105M160AE	CGA5L2X8R1E105M160AE	
			±10%			CGA5L3X8R1E155K160AE	
			±20%			CGA5L3X8R1E155M160AE	
1µF	1608	0.80+0.15/-0.10	±10%			CGA5L3X8R1E225K160AE	
			±20%			CGA5L3X8R1E225M160AE	
	2012	1.25+0.25/-0.20	±10%				CGA5L3X8R1C335K160AE
			±20%				CGA5L3X8R1C335M160AE
	3216	1.60+0.30/-0.20	±10%				CGA5L3X8R1C475K160AE
			±20%				CGA5L3X8R1C475M160AE
			±10%			CGA6P3X8R1E475K250AE	
			±20%			CGA6P3X8R1E475M250AE	
1.5µF	1608	0.80+0.15/-0.10	±10%				
			±20%				
	2012	1.25+0.25/-0.20	±10%				
			±20%				
	3216	1.60+0.30/-0.20	±10%				
			±20%				
			±10%				
			±20%				
2.2µF	1608	0.80+0.15/-0.10	±10%				
			±20%				
	2012	1.25+0.25/-0.20	±10%				
			±20%				
	3216	1.60+0.30/-0.20	±10%				
			±20%				
			±10%				
			±20%				
3.3µF	1608	0.80+0.15/-0.10	±10%				
			±20%				
	2012	1.25+0.25/-0.20	±10%				
			±20%				
	3216	1.60+0.30/-0.20	±10%				
			±20%				
			±10%				
			±20%				
4.7µF	1608	0.80+0.15/-0.10	±10%				
			±20%				
	2012	1.25+0.25/-0.20	±10%				
			±20%				
	3216	1.60+0.30/-0.20	±10%				
			±20%				
			±10%				
			±20%				

### Class 2 (Temperature Stable)

Temperature Characteristics: X8L (-55 to +150°C, +15/-40%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number
				Rated Voltage Edc : 50V
330nF	2012	1.25+0.25/-0.20	±10%	CGA4J1X8L1H334K125AE
			±20%	CGA4J1X8L1H334M125AE

 Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. Please note that the contents may change without any prior notice due to reasons such as upgrading.